

37
CLAIMS

1. A method of providing information about a real-world space, comprising the steps of :
 - (a) as the or each of at least one user moves through said space, virtual markers are deposited and stored to indicate associated locations visited by the user in the space, the virtual markers each having an initial strength value;
 - (b) the strength values associated with the stored markers, either taken in location-dependent aggregations or individually, are caused to decay with time;
 - (c) data about the current strength of the stored markers, either in aggregation or individually, is used to provide information relevant to use of the space.
2. A method according to claim 1, wherein the virtual markers are individually stored in step (a) and individually decayed in step (b), the current strength values of the individual markers being aggregated for use in step (c) on a location dependent basis.
3. A method according to claim 1, wherein each newly-deposited virtual marker is aggregated on a location-dependent basis with previously-deposited virtual markers by having its initial strength value aggregated with an existing aggregated strength value, if any, for the previously-deposited markers associated with the same location as the newly-deposited marker, this aggregation constituting, or being effected at the same time as, storage of the newly-deposited marker; step (b) being applied to the aggregated strength values.
4. A method according to claim 3, wherein a plurality of storage location cells are provided that each corresponds to a respective area of said space and holds the aggregated strength value for markers deposited in locations within that area, each marker being stored and aggregated by having its initial strength value added to the existing aggregated strength value stored in the location cell that corresponds to the area covering the location associated with the marker.
5. A method according to claim 4, wherein the storage and aggregation of a said marker involves, in addition to increasing the aggregated strength value of the corresponding

location cell by the initial strength value of the marker, increasing by a lesser amount the stored strength value of at least one location cell covering a said area adjacent to the area covering the location associated with the marker.

- 5 6. A method according to claim 1, wherein step (b) is effected independently of step (c).
7. A method according to claim 1, wherein step (b) is effected as a preliminary to carrying out step (c).
- 10 8. A method according to claim 1, wherein in step (b) the strength values are decayed by a fixed amount per unit time.
9. A method according to claim 1, wherein in step (b) the strength values are decayed by a fixed proportion per unit time.
- 15 10. A method according to claim 1, wherein multiple strength values are associated with each marker or marker aggregation, step (b) involving decaying these multiple strength values at different rates whereby to produce multiple current strength values for each stored marker or marker aggregation; step (c) comprising providing multiple types of information with the current strength values used when deriving a said information being dependent on its type.
- 20 11. A method according to claim 1, wherein at least some of said markers are deposited in step (a) with respective indicators as to whether or not the strength of the marker is to be decayed in step (b); step (b) further comprising, for a said marker deposited with a said indicator, checking said indicator and decaying or not decaying the strength of the marker accordingly.
- 25 12. A method according to claim 1, wherein said virtual markers are deposited automatically at one of:
 - predetermined intervals of time;
 - predetermined intervals of distance; or

- predetermined locations in said space.

13. A method according to claim 1, wherein the said virtual markers deposited in respect of each user are deposited by a mobile device carried by the user.

5

14. A method according to claim 13, wherein the virtual markers are stored in a central system.

15. A method according to claim 1, wherein the said virtual markers are deposited and
10 stored by an infrastructure system that monitors the locations of the users.

16. A method according to claim 1, wherein in step (a) the virtual markers deposited in respect of a first said user have associated data indicative of the user concerned and are individually stored, step (c) involving providing information about the path taken by the
15 first user by identifying the virtual markers associated with that user and using the relative strength values of the markers to determine the direction of progression of the user concerned along said path.

17. A method according to claim 1, wherein step (c) comprises presenting, as said
20 information, an image of a virtual landscape defined by the relative strengths of location-dependent marker aggregations mapped to a representation of the space.

18. A method according to claim 1, wherein in step (c) said information comprises information about a path through the space, this information being derived by determining
25 a path that follows ridges in a virtual landscape defined by the relative strengths of location-dependent aggregations of markers.

19. A method according to claim 1, wherein in step (c) said information comprises information about a path through the space, this information being derived by determining
30 a path that follows troughs in a virtual landscape defined by the relative strengths of location-dependent aggregations of markers.

20. A method according to claim 1, wherein in step (c) said information comprises information about a path through the space, this information being derived by determining a path that avoids ridges in a virtual landscape defined by the relative strengths of location-dependent aggregations of markers.

5

21. A method according to claim 1, wherein in step (c) said information comprises information about a path through the space, this information being derived by determining a path that avoids troughs in a virtual landscape defined by the relative strengths of location-dependent aggregations of markers.

10

22. A method according to claim 1, wherein step (c) involves using the current-strength data to predict a next location for a further user moving through the space having regard to that user's current location, this predicted next location then being used to provide to a mobile device of the further user, as said information, either the identify of media items associated with that predicted next location or the items themselves.

15

23. A method according to claim 1, wherein in step (a) a said virtual marker is deposited whenever a said user visits a location corresponding to a feature of interest in the space, step (c) involving using the current-strength data of feature-related marker aggregations to provide information about the popularity of the features concerned.

20

24. A method according to claim 1, wherein in step (a) a said virtual marker is deposited upon a said user requesting, whilst at a location corresponding to a feature of interest in the space, to be presented with a media item concerning that feature; step (c) involving using the current-strength data of feature-related marker aggregations to provide information about the popularity of the features concerned.

25

25. A method according to claim 1, wherein step (c) is effected for a further user moving through the space with said information being provided to that user.

30

26. Apparatus for providing information about a real-world space, the apparatus comprising:

- a first arrangement arranged to deposit and store virtual markers to indicate associated locations visited by each of multiple users in the space;
 - a second arrangement arranged to decay with time the strength values associated with the stored markers, either taken in location-dependent aggregations or individually; and
- 5 - a third arrangement arranged to use data about the current strength of the stored markers, either in aggregation or individually, to provide information relevant to use of the space.

27. Apparatus according to claim 26, wherein the first arrangement is arranged to store the
10 virtual markers individually and the second arrangement is arranged to individually decay the strength values of the markers individually, the third arrangement being arranged to aggregate, on a location dependent basis, the current strength values of the individual markers for use as said data.
- 15 28. Apparatus according to claim 26, wherein the first arrangement is arranged to aggregate, on a location-dependent basis, each newly-deposited virtual marker with previously-deposited virtual markers by having its initial strength value aggregated with an existing aggregated strength value, if any, for the previously-deposited markers associated with the same location as the newly-deposited marker, this aggregation constituting, or
20 being effected at the same time as, storage of the newly-deposited marker; the second arrangement being arranged to decay the aggregated strength values.
29. Apparatus according to claim 27, wherein the first arrangement comprises a plurality of storage location cells that correspond to respective areas of said space, the first
25 arrangement being arranged to store and aggregate each deposited marker by having its strength value added to an existing aggregated strength value, if any, stored in the location cell that corresponds to the area covering the location associated with the marker.
30. Apparatus according to claim 29, wherein the first arrangement is arranged, when
30 storing and aggregating a said marker, not only to increase the aggregated strength value of the corresponding location cell by the strength value of the marker, but also to increase by

a lesser amount the aggregated strength value of at least one location cell covering a said area adjacent to the area covering the location associated with the marker.

31. Apparatus according to claim 26, wherein the second arrangement is arranged to decay
5 said strength values independently of the third arrangement.

32. Apparatus according to claim 26, wherein the second arrangement is arranged to decay said strength values as a preliminary to the third arrangement using the data on the current strength values.

10

33. Apparatus according to claim 26, wherein the second arrangement is arranged to decay said strength values by a fixed amount per unit time.

15

34. Apparatus according to claim 26, wherein the second arrangement is arranged to decay said strength values by a fixed proportion per unit time.

20

35. Apparatus according to claim 26, wherein the first arrangement is arranged to associate multiple strength values with each marker or marker aggregation, the second arrangement being arranged to decay these multiple strength values at different rates whereby to produce multiple current strength values for each stored marker or marker aggregation, and the third arrangement being arranged to provide multiple types of information with the current strength values used when deriving a said information being dependent on its type.

25

36. Apparatus according to claim 26, wherein the first arrangement is arranged to cause at least some of said markers to be deposited with respective indicators as to whether or not the strength of the marker is to be decayed; the second arrangement being further arranged, for a said marker deposited with a said indicator, to check said indicator and to decay or not decay the strength of the marker accordingly.

30

37. Apparatus according to claim 26, wherein the first arrangement comprises mobile devices intended to be carried by said multiple users, each mobile device being arranged to deposit said virtual markers in respect of a said user carrying the device.
- 5 38. Apparatus according to claim 37, wherein the first arrangement further comprises a central system for storing the virtual markers deposited by the mobile devices.
39. Apparatus according to claim 26, wherein the first arrangement comprises an infrastructure system arranged to monitors the locations of the users and to deposit and
10 store said virtual markers.
40. Apparatus according to claim 26, wherein the first arrangement is arranged to deposit and individually store, in respect of a first said user, virtual markers with associated data indicative of the user concerned, the third arrangement being arranged to provide
15 information about the path taken by the first user by identifying the virtual markers associated with that user and using the relative strength values of the markers to determine the direction of progression of the user concerned along said path.
41. Apparatus according to claim 26, wherein the third arrangement is arranged to present,
20 as said information, an image of a virtual landscape defined by the relative strengths of location-dependent marker aggregations mapped to a representation of the space.
42. Apparatus according to claim 26, wherein the third arrangement is arranged to derive information about a path through the space by determining a path that follows ridges in a
25 virtual landscape defined by the relative strengths of location-dependent aggregations of markers.
43. Apparatus according to claim 26, wherein the third arrangement is arranged to derive information about a path through the space by determining a path that follows troughs in a
30 virtual landscape defined by the relative strengths of location-dependent aggregations of markers.

44. Apparatus according to claim 26, wherein the third arrangement is arranged to derive information about a path through the space by determining a path that avoids ridges in a virtual landscape defined by the relative strengths of location-dependent aggregations of markers.

5

45. Apparatus according to claim 26, wherein the third arrangement is arranged to derive information about a path through the space by determining a path that avoids troughs in a virtual landscape defined by the relative strengths of location-dependent aggregations of markers.

10

46. Apparatus according to claim 26, wherein the third arrangement is arranged to use the current-strength data to predict to predict a next location for a further user moving through the space having regard to that user's current location, the third arrangement being further arranged to use the predicted next location to provide to a mobile device of the further user,

15 46. Apparatus according to claim 26, wherein the third arrangement is arranged to use the current-strength data to predict to predict a next location for a further user moving through the space having regard to that user's current location, the third arrangement being further arranged to use the predicted next location to provide to a mobile device of the further user, as said information, either the identify of media items associated with that predicted next location or the items themselves.

47. Apparatus according to claim 26, wherein the first arrangement is arranged to deposit a said virtual marker whenever a said user visits a location corresponding to an item of interest, the third arrangement being arranged to use the current-strength data of feature-related marker aggregations to provide information about the popularity of items of interest in said space.

48. Apparatus according to claim 26, wherein the first arrangement is arranged to deposit a said virtual marker upon determining that a said user is at a location corresponding to a feature of interest in the space and has requested to be presented with a media item concerning that feature, the third arrangement being arranged to use the current-strength data of feature-related marker aggregations to provide information about the popularity of the features concerned.

30

49. Apparatus according to claim 26, wherein the third arrangement comprises a mobile device for enabling a further user in said space to request and be presented with said information.